

Cement MILL SECTION of Concrete

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Cement in 1923

BY ROBERT W. LESLEY

PAST PRESIDENT, PORTLAND CEMENT ASSOCIATION

The year 1923 was an epochal one in the production of portland cement. The great year of 1922 was exceeded by nearly 23,000,000 bbls., the percentage of increase being about one-fifth, or 20%.

Table 1 shows the remarkable growth of the industry since 1921, the gain in shipments over 1921 amounting to over 40,000,000 bbls.

TABLE 1—PRINCIPAL HYDRAULIC CEMENTS SHIPPED FROM FACTORIES IN THE UNITED STATES (a)

Class	1921.		1922.		1923.	
	Quantity (Barrels)	Value	Quantity (Barrels)	Value	Quantity (Barrels)	Value
Portland	95,507,147	\$180,778,415	117,701,216	\$207,170,430	135,912,118	\$257,684,424
M's'nry,	539,402	897,025	889,428	1,293,598	1,271,674	1,947,352
natural						
Puzzolan						
Total.	96,046,549	\$181,675,440	118,590,644	\$208,464,208	137,183,792	\$259,631,776

(a) U. S. Geological Survey

This striking increase is borne out even more clearly in the per capita consumption presented herewith, showing the growth from 1914 to 1923, the growth in the last year being from 1.06 bbl. per capita to 1.21 bbl., the largest gain made in any year of the series shown. These figures which follow are based upon the result of American mills shipments only, and would be increased slightly by the increase in imports of foreign cement over exports of cement of American manufacture. From tables of the Geological Survey reports, not reproduced here, the per capita consumption of the various states from year to year shows considerable variation due to various conditions of road-building, construction of important public works, dams, reservoirs, etc., and also in increased building of concrete houses. California, with its great road-building program and its increased concrete home building, heads the list with 2.69 bbls. per capita; Michigan, the great pioneer concrete road state, stands second with 1.87 per capita. Illinois is third, due to road building and massive mill and office construction in Chicago; while Delaware, with its great Du Pont concrete highway, occupies fourth place. Mississippi brings up the rear, with a consumption of only 0.26 bbls. per capita.

The per capita figures from 1914 to 1923 are as follows:

Year	Barrels	Year	Barrels
1914.....	0.77	1919.....	0.77
1915.....	0.83	1920.....	0.86
1916.....	0.89	1921.....	0.87
1917.....	0.84	1922.....	1.06
1918.....	0.64	1923.....	1.21

From Mineral Industry.

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In connection with this per capita growth, the distribution of the cement among consumers and its various uses is of great interest, and the figures in Table 2 show the importance to the country of the great concrete road building era, with its large consumption of the most stable of road building materials.

TABLE 2—DISTRIBUTION OF PORTLAND CEMENT CONSUMPTION IN 1923

Commercial buildings.....	24.9
Pavings, highways.....	24.0
Farm uses.....	20.6
Dwellings.....	9.4
Sidewalks.....	6.9
Railways.....	5.2
Miscellaneous.....	9.0

While table 3, showing the average price of portland cement from 1870 to 1923, shows an increase of 14¢ per bbl. in the factory price, as compared with the previous year, there is a decrease from the 1920 price to a parity with the 1921 price, and this in the face of higher coal costs caused by the settlements in the disastrous and protracted coal and railroad strikes which occurred during the previous year.

TABLE 3—AVERAGE PRICE PER BARREL OF PORTLAND CEMENT, 1870-1923

1870-1880.....	\$3.00	1897.....	\$1.61	1911.....	\$0.844
1881.....	2.50	1898.....	1.62	1912.....	0.813
1882.....	2.01	1899.....	1.43	1913.....	1.005
1883.....	2.15	1900.....	1.09	1914.....	0.927
1884.....	2.10	1901.....	0.99	1915.....	0.860
1885-1888.....	1.95	1902.....	1.21	1916.....	1.103
1889.....	1.67	1903.....	1.24	1917.....	1.354
1890.....	2.09	1904.....	0.88	1918.....	1.598
1891.....	2.13	1905.....	0.94	1919.....	1.710
1892.....	2.11	1906.....	1.13	1920.....	2.020
1893.....	1.91	1907.....	1.11	1921.....	1.890
1894.....	1.73	1908.....	0.85	1922.....	1.760
1895.....	1.60	1909.....	0.813	1923.....	1.900
1896.....	1.57	1910.....	0.891		

Tables 4 and 5 show the figures of the United States Geological Survey covering production, stock on hand, shipments, cement shipped and in stock, and the average factory prices in 1922 and 1923. These tables are divided and show, first, production by the well known commercial districts into which the industry has been geographically divided, and second, the same production divided among the various cement producing states. The same form of division into commercial districts and states is also followed in dealing with the shipments of cement, which are covered in Table 5.

In considering these tables, some of the states and districts show large gains, but on examination of the figures on production, it will be found that Alabama had in 1923 five cement works against three in the previous year, which accounts for its gain of 53%, as the new mills around Birmingham of the Phoenix and Lehigh companies, together with the increase in the Atlas plant, were all large developments. California's

increase was due to large road building, water-power, and state works of various kinds, while a new plant contributed to the growth of Iowa's production. Ohio's gain of 48% is explained by the new works of the Sandusky company at Toledo. The district of eastern Pennsylvania, New Jersey, and Maryland remained quite steady in shipments, showing an increase of 13% as compared with an average of 15% for the country at large.

Another interesting fact is shown in Table 1, namely, the great increase in natural cement, which made up the great bulk of the material classed under the heading of "Masonry, natural and puzzolan cements," which shows a gain of 43% in 1923 over 1922, the total shipments from the ten operating plants being 1,271,674 bbls. against 889,428 bbls. in 1922. This revival in the manufacture of cements of the type of the old natural cements, for so many years well known in the United States, indicates an improvement in materials of this type and their enlarged use in brick-laying and masonry requiring plastic, "smooth" mortar. While this development in a class of cements of a lower type than the artificial, manufactured, portland cement has been going on, the production of alumina cements of the quick-hardening type, for many years in use in France, has been begun in this country; and one of the large cement companies has established a plant for the manufacture of this grade of material.

Table 6 shows the imports of foreign cement in barrels. Table 7 shows the export of cement in barrels. While the latter figures show a decrease of about 12%, or about 120,000 bbls., as compared with 1922, the imports of hydraulic cement in 1923 show a large increase, being nearly five times as many barrels as were imported in the previous year.

TABLE 6—IMPORTS OF FOREIGN CEMENT, IN BARRELS OF 380 LB. (a)

1889.....	1,740,356	1901.....	939,330	1913.....	85,470
1890.....	1,940,186	1902.....	1,963,023	1914.....	120,906
1891.....	2,988,313	1903.....	2,251,969	1915.....	42,218
1892.....	2,440,654	1904.....	968,409	1916.....	1,836
1893.....	2,674,149	1905.....	896,845	1917.....	2,323
1894.....	2,638,107	1906.....	2,273,493	1918.....	305
1895.....	2,997,395	1907.....	2,033,438	1919.....	8,931
1896.....	2,989,597	1908.....	842,121	1920.....	524,604
1897.....	2,090,924	1909.....	443,888	1921.....	122,322
1898.....	1,152,861	1910.....	306,863	1922.....	323,823
1899.....	1,152,861	1911.....	164,670	1923.....	1,678,636
1900.....	2,386,683	1912.....	68,503		

(a) After 1920, barrels of 376 lb.

TABLE 7—EXPORTS OF CEMENT, IN BARRELS

Year	Quantity	Value	Percentage of Total	Year	Quantity	Value	Percentage of Total
1906	583,299	\$ 944,886	1.1	1915	2,565,031	\$3,361,451	2.9
1907	900,550	1,450,841	1.7	1916	2,563,976	3,828,231	2.7
1908	846,528	1,249,229	1.6	1917	2,586,215	5,328,536	2.8
1909	1,056,922	1,417,534	1.6	1918	2,252,446	5,912,166	3.2
1910	2,475,957	3,477,981	3.2	1919	2,463,573	7,513,389	2.9
1911	3,135,409	4,632,215	3.9	1920	2,985,807	10,045,369	3.1
1912	4,215,532	6,160,341	5.1	1921	1,181,014	4,276,986	1.2
1913	2,964,358	4,270,666	3.3	1922	1,127,845	3,206,201	1.0
1914	2,140,197	3,088,809	2.5	1923	1,001,688	2,944,174	0.7

The use of American portland cement in the out-lying possessions of the United States is shown by the following table:

TABLE 8—DOMESTIC CEMENT SHIPPED TO ALASKA, HAWAII, AND PORTO RICO, IN 1921, 1922 AND 1923

	1921		1922		1923	
	Barrels	Value	Barrels	Value	Barrels	Value
Alaska....	10,015	\$ 41,239	20,345	\$ 74,950	10,131	\$ 41,511
Hawaii....	170,579	574,946	201,353	609,330	178,882	544,148
Porto Rico.	116,082	395,046	125,418	323,338	99,275	250,844
	296,676	1,011,231	347,116	1,007,618	288,288	836,503

In the report of the Geological Survey, from which most of these tables are taken, there appears this year a new and very interesting set of figures, shown in Table 9. These are the estimated manufacturing capac-

ities of the plants in the several commercial districts. As the table shows, the capacity was increased from 146,203,000 bbls. to 161,858,000 bbls. in 1923, mostly by the increase in new plants, from 118 to 123. Accord-

TABLE 9—PORTLAND-CEMENT MANUFACTURING CAPACITY BY COMMERCIAL DISTRICTS, 1922 AND 1923

District	Estimated Capacity (Barrels)		Percentage of Capacity Utilized	
	1922	1923	1922	1923
Eastern Pennsylvania, New Jersey, and Maryland.....	41,921,000	42,195,000	74.4	84.7
New York.....	8,567,000	8,306,000	69.1	84.2
Ohio, Western Pennsylvania and West Virginia.....	12,133,000	15,090,000	88.6	89.4
Michigan.....	7,930,000	9,346,000	78.7	81.5
Illinois, Indiana, and Kentucky.....	21,550,000	22,296,000	83.5	95.1
Virginia, Tennessee, Alabama and Georgia.....	7,113,000	10,719,000	83.7	73.8
Eastern Missouri, Iowa, and Minnesota.....	14,177,000	16,580,000	80.4	84.7
Western Missouri, Nebraska, Kansas and Oklahoma.....	10,215,000	11,795,000	78.6	82.9
Texas.....	4,425,000	4,642,000	82.0	90.0
Colorado and Utah.....	2,850,000	3,025,000	70.9	80.3
California.....	10,464,000	12,594,000	83.3	87.4
Oregon, Washington and Montana.....	4,858,000	5,270,000	60.6	58.9
	146,203,000	161,858,000	78.5	84.9

ing to the figures of production shown by commercial districts in Table 4, it will be seen that, in 1923, 84.9% of the capacity was utilized, while, in 1922, 78.5% was productive. An interesting figure in this table is the fact that four of the eleven districts show the percentage of capacity utilized practically the same as the average for the whole country, while only one district, Oregon, Washington, and Montana, falls far short of the average capacity utilized. Many interesting conclusions may be drawn from this new table, which will prove of great value in the future.

Table 10 shows the fuels used in the manufacture of portland cement. The use of natural gas shows a gain over 1922, as does crude oil, and while coal shows a slight percentage of gain, the combinations of coal and crude oil and coal and natural gas show a falling-off, which is a reasonable result in view of the fact that 1922 was the year of coal strikes and many mills had to resort to new methods of burning all kinds of poor coals. As fuel constitutes one of the largest items in the cost of manufacture of portland cement, much attention is being centered on this important element and its economical use.

TABLE 10—STATISTICS SHOWING FUEL USED IN BURNING PORTLAND CEMENT(a)

Fuel	1922				1923			
	No. of Plants	No. of Kilns	Barrels of Cement	Percentage of Total	No. of Plants	No. of Kilns	Barrels	Percentage of Total
Coal.....	90	590	86,864,274	75.7	101	641	108,272,858	78.7
Coal and oil	7	64		10.5	1	24		
Coal and gas	1	6	12,030,542				8,091,506	5.9
Oil and gas					2	9		
Oil.....	17	85	12,794,890	11.1	18	95	16,313,410	11.9
Coal, oil and gas	2	8			3	18		
Natural gas	1	7	3,100,278	2.7	1	6	4,782,464	3.5
Total....	118	760	114,789,984	100.0	126	793	137,460,238	100.0

(a) U. S. Geological Survey

SCIENTIFIC DEVELOPMENT

While the year 1922 was marked by the celebration of the twentieth anniversary of the Portland Cement Association, the organization which has had so much to do with the development of the industry, the year 1923 was the occasion of another anniversary celebration, namely, that of the American Concrete Institute, which was established in 1903 as an association of portland cement users. Growing from small beginnings, this organization, whose name was changed to that of the American Concrete Institute, stands in the fore-

TABLE 4.—PORTLAND CEMENT PRODUCED AND IN STOCK IN THE UNITED STATES, BY DISTRICTS AND STATES (a)

Commercial District	Production					Stock		
	Active Plants		Quantity (Barrels)		Percent- age of Change	Quantity (Barrels)		Per- centage of Change
	1922	1923	1922	1923		1922 (Revised)	1923	
Eastern Pennsylvania, New Jersey, and Maryland.....	22	22	31,195,617	35,721,751	+15	2,295,324	1,883,112	— 18
New York.....	9	9	5,922,706	6,990,174	+18	516,151	653,263	+ 27
Ohio, Western Pennsylvania and West Virginia.....	10	11	10,753,301	13,495,799	+26	776,261	1,060,680	+ 37
Michigan.....	12	14	6,243,805	7,619,792	+22	630,383	783,892	+ 24
Illinois, Indiana, and Kentucky.....	10	10	17,998,914	21,193,666	+18	1,434,407	1,571,159	+ 10
Virginia, Tennessee, Alabama and Georgia.....	8	11	5,954,043	7,908,846	+33	169,597	457,593	+170
Eastern Missouri, Iowa, and Minnesota.....	9	10	11,392,552	14,037,099	+23	1,516,568	1,929,494	+ 27
Western Missouri, Nebraska, Kansas, and Oklahoma.....	11	11	8,025,720	9,779,034	+22	956,887	1,162,918	+ 22
Texas.....	5	5	3,628,756	4,178,895	+15	190,762	278,373	+ 46
Colorado and Utah.....	5	5	2,020,784	2,427,971	+20	202,608	290,193	+ 43
California.....	9	9	8,711,515	11,001,910	+26	292,486	411,594	+ 41
Oregon, Washington, and Montana.....	9	9	2,942,271	3,105,301	+ 6	370,816	418,099	+ 13
	118	126	114,789,984	137,460,238	+20	9,352,250	10,900,370	+ 17
Alabama.....	3	5	2,290,884	3,497,256	+53	34,901	136,765	+292
California.....	9	9	8,711,515	11,001,910	+26	292,486	411,594	+ 41
Illinois.....	4	4	6,407,129	7,147,906	+12	643,244	661,942	+ 3
Iowa.....	4	5	4,272,432	5,732,470	+34	790,447	952,242	+ 20
Kansas.....	7	7	4,634,287	6,025,657	+30	621,927	768,745	+ 24
Michigan.....	12	14	6,243,805	7,619,792	+22	630,383	783,892	+ 24
Missouri.....	5	5	6,170,633	7,305,997	+18	636,625	798,739	+ 25
New York.....	9	9	5,922,706	6,990,174	+18	516,151	653,263	+ 27
Ohio.....	5	6	2,835,243	4,188,755	+48	161,797	347,231	+115
Pennsylvania.....	22	22	33,276,093	38,157,482	+15	2,574,229	2,120,859	— 18
Texas.....	5	5	3,628,756	4,178,895	+15	190,762	278,373	+ 46
Washington.....	4	4	1,942,781	2,105,711	+ 8	246,660	240,892	- 2
Other states (b).....	29	31	28,453,720	33,508,233	+18	2,012,638	2,745,833	+ 36
	118	126	114,789,984	137,460,238	+20	9,352,250	10,900,370	+ 17

(a) U. S. Geological Survey (b) Colorado, Georgia, Indiana, Kentucky, Maryland, Minnesota, Montana, Nebraska, New Jersey, Oklahoma, Oregon, Tennessee, Utah, Virginia, and West Virginia.

TABLE 5.—PORTLAND CEMENT SHIPPED IN THE UNITED STATES, BY DISTRICTS AND STATES (a)

Commercial District	Shipments					Average Factory Price per Barrel	
	1922		1923		Percentage of Change in Quan- tity		
	Quantity (Barrels)	Value	Quantity (Barrels)	Value			
	1922	1923					
Eastern Pennsylvania, New Jersey, and Maryland.....	31,897,649	\$51,953,144	36,133,963	\$65,536,543	+13	\$1.63	\$1.81
New York.....	6,194,663	10,694,426	6,853,062	12,834,471	+11	1.73	1.87
Ohio, Western Pennsylvania, and West Virginia.....	11,040,908	18,586,754	13,211,380	24,183,471	+20	1.68	1.83
Michigan.....	6,349,751	11,145,573	7,466,283	14,038,322	+18	1.76	1.88
Illinois, Indiana and Kentucky.....	18,676,656	30,159,728	21,056,914	37,010,579	+13	1.61	1.76
Virginia, Tennessee, Alabama and Georgia.....	6,158,652	10,854,347	7,620,850	14,210,617	+24	1.76	1.86
Eastern Missouri, Iowa, and Minnesota.....	11,657,484	19,528,016	13,624,173	25,022,674	+17	1.68	1.84
Western Missouri, Nebraska, Kansas and Oklahoma.....	7,967,266	14,570,823	9,573,003	18,185,384	+20	1.83	1.90
Texas.....	3,730,477	7,515,932	4,091,284	8,011,226	+10	2.01	1.96
Colorado and Utah.....	2,063,500	4,609,605	2,340,386	5,163,340	+13	2.23	2.21
California.....	9,041,788	20,478,577	10,882,802	26,022,156	+20	2.26	2.39
Oregon, Washington and Montana.....	2,922,422	7,073,505	3,058,018	7,465,641	+ 5	2.42	2.44
	117,701,216	\$207,170,430	135,912,118	\$257,684,424	+15	\$1.76	\$1.90
Alabama.....	2,324,116	\$ 4,135,684	3,395,392	\$ 6,257,673	+46	\$1.78	\$1.84
California.....	9,041,788	20,478,577	10,882,802	26,022,156	+20	2.26	2.39
Illinois.....	6,554,945	10,584,171	7,129,208	12,550,100	+ 9	1.61	1.76
Iowa.....	4,475,074	7,709,313	5,570,675	10,351,971	+24	1.72	1.86
Kansas.....	4,556,517	8,138,268	5,878,839	10,868,590	+20	1.79	1.85
Michigan.....	6,349,751	11,145,573	7,466,283	14,038,322	+18	1.76	1.88
Missouri.....	6,239,144	10,457,557	7,143,883	13,237,141	+15	1.68	1.85
New York.....	6,194,663	10,694,426	6,853,062	12,834,471	+11	1.73	1.87
Ohio.....	2,913,034	5,243,687	4,003,321	7,615,741	+37	1.80	1.90
Pennsylvania.....	34,023,695	55,528,002	38,610,852	69,792,343	+13	1.63	1.81
Texas.....	3,730,477	7,515,932	4,091,284	8,011,226	+10	2.01	1.96
Washington.....	1,951,414	4,684,624	2,111,479	4,988,022	+ 8	2.40	2.36
Other States (b).....	29,346,598	50,854,616	32,775,038	61,116,668	+12	1.73	1.86
	117,701,216	\$207,170,430	135,912,118	\$257,684,424	+15	\$1.76	\$1.90

(a) U. S. Geological Survey (b) Colorado, Georgia, Indiana, Kentucky, Maryland, Minnesota, Montana, Nebraska, New Jersey, Oklahoma, Oregon, Tennessee, Utah, Virginia and West Virginia.

front of the scientific treatment of concrete in its various forms. The celebration of the twentieth anniversary of its birth was marked by an interesting meeting at Chicago, where a series of papers dealing with concrete in all its forms was presented by engineers and experts from all parts of the country. An interesting feature of the meeting was an exhibit of the development of concrete in the United States, many objects of the greatest public interest being shown. Preparations were started in the year 1923 toward the celebration of the one hundredth anniversary of the original patent of Joseph Aspdin on portland cement. This celebration, which took place in Chicago in 1924, drew manufacturers, engineers, consumers, and scientists from all parts of the world, and was

America's tribute to the inventor of portland cement. In England, the land of Aspdin's birth, a similar celebration was held in the fall of 1924. In connection with this recognition of the centennial anniversary of the invention of cement, a pleasant feature was the visit of a number of representatives of the Federation of British Portland Cement Manufacturers to this country in the fall of 1923. As guests of the Portland Cement Association, the visitors were taken to cement mills in various parts of the country, over the cement roads around Detroit, and to the Portland Cement Association offices in Chicago. The American Society for Testing Materials, through its various committees dealing with cement and concrete, did excellent work during the past year. Com-

mittee C-1 on cement specifications had a number of meetings, and devoted considerable time to the preparation of a manual for those using the standard specifications. Committee C-9, whose function is the preparation of specifications for aggregates, sand, gravel, crushed stone, etc., for concrete making, had many interesting and important meetings during the year. The making of specifications for concrete by the Joint Committee, consisting of representatives of the American Society of Civil Engineers, the American Railway Engineering Association, the American Concrete Institute, the Portland Cement Association, and the American Society for Testing Materials, together with a delegate from the Institute of Architects, contributed largely to scientific knowledge in the shape of the records of field tests of concrete made at several important building operations in New York and New Jersey, through the cooperation of the New York group of contractors and the Structural Materials Research Laboratory of the Lewis Institute, Chicago. Much of this important work, on five specific jobs, where trained organizations of long experience were used, gave concrete as having an average strength from 6 to 18% greater than that assumed for purposes of design, and well above the value in the Joint Committee table.

Important scientific work that has been done within the past year in the matter of concrete includes Dr. Abrams' examination into the percentages of water to be used in making concrete, and also in a number of experiments with and examinations into work done with concrete exposed to salt water and various alkalis.

On the manufacturing side of cement, interesting experiments on grinding the raw material and finished product to various fineness and various shapes of particles are under way.

Another interesting fact in this field is the abandonment of potash production from the burning of portland cement clinker, which was done at several works during the war when potash commanded \$300 to \$400 a ton. Since the return to peace and German and French imports of potash, this field of production has been practically abandoned.

In the matter of architectural development, the year has been marked by considerable growth in the architectural and decorative use of portland cement. In this field, the work of John J. Early, of Washington, deserves special mention.

CEMENT ACTIVITIES IN FOREIGN FIELDS EUROPE

France.—Stabilization, the keynote of all industrial endeavor in France, has influenced the cement situation. Effort has been made to carry on building operations in spite of high costs. In so far as this has affected the portland cement industry, reports of four leading French manufacturing companies are pertinent as to facts and figures showing the value of such industrial property. Before the war, a metric ton of portland cement sold in France for 30 to 35 francs; soon after the armistice it was quoted at 280 francs; and in August, 1923, at an average figure of 115 francs, rising to 125 francs in some districts. The before-the-war price was nominally \$7 per ton at the then ruling rate of exchange; that of the above date (with a 6-cent franc) about the same in case the product was bought with American cash by some American firm operating in France, but at a figure which is three and a half times that if the purchaser is a Frenchman buying with francs.

Some fifty-odd structures, built of compressed concrete block with a cement binder forced into the joints under pressure, have been erected by a firm

in the Paris district, which abandoned a long-traditional career to espouse this new idea of fabricating the modest cottage home at a lower figure and in a more solid manner than was known before. The figures were \$360, \$510, and \$684 for two-, three-, and four-room houses respectively.

Belgium.—The Belgian cement industry reached the pre-war status in 1923. Production for the first eleven months of that year was 865,099 tons, valued at 125,000,000 francs. A large percentage of output was sent to Holland and France, the former getting 248,274 tons and the latter 172,060 tons. There are about 20 large firms and many small concerns manufacturing cement in Belgium.

England.—The earnings of the Associated Portland Cement Manufacturers, Ltd., showed a large falling-off for 1923 as compared with 1922, and the usual dividend on common stock was passed. This was attributed to the decline in exports, resulting in largely decreased output.

The British Portland Cement Manufacturers, Ltd., a subsidiary of the Associated concern, reported net earnings of £449,419, and after paying dividends and charges, a balance of £187,751 was carried over.

Exports of cement credited to the United Kingdom for 1923 amounted to 562,381 tons.

Germany.—Lack of new building projects has seriously curtailed domestic consumption of cement in Germany.

The maximum cement prices in Germany were abolished by decree of Nov. 23, 1923, and Dec. 1, the Government gave up general control and lifted the export embargo. It was felt, therefore, that new foreign markets must be created, particularly in South America, to dispose of the products now on the overstocked domestic market. German exports for 1923 aggregated 3,776,374 bbls. of portland and roman cements.

Czecho-Slovakia.—The year 1923 was marked by a falling-off of 30% in prices obtained for portland cement and lime.

Poland.—The 1923 estimate of the maximum annual capacity of portland cement works in Poland was 1,044,000 metric tons, with actual production less than 50% of capacity. Twelve cement companies employing 3700 men were operating. There was difficulty in meeting German competition.

Roumania.—At the close of 1923, Roumania had 12 plants manufacturing cement and lime of various kinds.

Austria.—Austria has 16 cement factories, with a capacity of 750,000 metric tons, but it is said that four of the mills of a single company could meet domestic requirements. Success of the industry seems dependent on ability to develop foreign markets.

Spain.—The Asland Portland Cement Co., near Barcelona, one of the largest of the 20 or more cement plants in operation in Spain, carried out plans for increased capacity during 1923, looking to an annual output of some 300,000 metric tons.

Denmark.—Having a domestic supply of cement-making materials, which is not the case with her other industries, Denmark has 8 cement works. Danish manufacturers have shifted in recent years from European markets and are looking to Asiatic and South American trade, especially the latter.

Norway.—There are four important manufacturers of cement in Norway. These have formed a syndicate or cartel, with a common sales organization in Christiania. Total capacity is estimated at 1,100,000 bbls.

Finland.—Finland has two cement plants, with production sufficiently large to more than take care of domestic requirements, leaving a surplus for export.

CONCRETE

NORTH AMERICA

Canada.—The manufacture of portland cement in Canada showed an increase of approximately 700,000 bbls., but the price recession that went into effect on Jan. 1, 1923, resulted in the value for the year falling below the totals for 1922 by more than \$1,125,000. The total sales of cement during 1923 have been estimated at 7,651,000 bbls., valued at \$14,291,000. Total mill output was 7,688,196 bbls.

Ten plants were producing in 1923, 4 in Ontario, 1 in Quebec, 2 in Manitoba, 2 in Alberta, and 1 in British Columbia. The sales value was reported at \$2.00 per bbl. in 1923 as against \$2.22 in 1922. Imports of portland cement in 1923 amounted to 17,697 bbls., with exports of 493,751 bbls.

Market conditions in rural districts in 1923 were reported as very poor, owing to rapid deflation in the price of farm produce.

Mexico.—Mexican manufacturers of portland cement are said to have launched an active publicity campaign designed to encourage consumption of the domestic product, and looking to the restriction or cessation of Government concessions to foreign makers in the shape of free imports.

The latter was the subject of protest by Mexican manufacturers in June, 1923. There are five Mexican cement companies, with a total annual production of 310,000 metric tons.

Panama.—Consular reports from Panama in 1921 referred to increasing importations of European cement. In July of 1923, it was stated in a further report that at that time there was practically no market for cement of American manufacture in the country. Local contractors and dealers are thoroughly familiar with American standard brands of cement, and conditions of price and quality being equal, they would probably be ordered in preference wherever the commodity was required.

During the year 1921, German cement was introduced in considerable quantities, but this has not given entire satisfaction. Norwegian cement, imported in 1922 and since that period, has been found to compare very favorably with standard American makes, and is now being received in larger quantities.

SOUTH AMERICA

Argentina.—The large cement works at Sierras Bayas is manufacturing under the brand of San Martin. The plant has a capacity of 165,000 tons a year, but thus far full output has not found a market.

Brazil.—In July of 1923, there was only one plant producing cement in Brazil, this being located in the State of Sao Paulo. The cost of the cement produced there approximates that of the imported product, while its quality is inferior. Because of a lack of the proper sort of coal for making cement, the manufacture of this material has not developed. With the growth of the national coal industry and modern methods of washing coal, thus reducing the impurities in the coal and permitting its use in cement manufacture, new activities are awaited. There are now several prospects under consideration for producing cement in Brazil, one of the principal plans being that of the State of Rio Grande do Sul, which owns a coal mine at Gravatahy, a short distance east of Porto Alegre, in the vicinity of which mine the material necessary for making cement has been located.

Most of the cement imported at present comes from Germany, because of the low German price on this product.

As large quantities of cement are consumed each year in Brazil, the following import figures from leading countries are suggestive, these covering the year 1922:

	Metric Tons
Germany.....	78,878
Denmark.....	37,860
Great Britain.....	23,592
Belgium.....	21,852
Sweden.....	13,032
United States.....	10,183

Venezuela.—Owing to the construction of concrete roads and streets, cement consumption has increased largely, a goodly portion of the cement coming from the United States. A contract for a local brand has been made to meet some of the requirements.

ASIA

China.—Two new works came into operation in 1923, the Hsin-yi and the Chung-lu plants. A third plant projected that year, the Shang-hai Portland Cement Works, Ltd., appears to have justified an unusual plan. Contiguity of cement rock and coal is rare in China, so this plant was built close to a commercial center, with raw material brought in instead of establishing the mill at a quarry site. There were six plants operating in China in 1923, daily capacity ranging from 350 to 3000 bbls.

It is reported that a new plant will be in operation in the north of China, backed by the Ching-Ching coal interests.

Japan.—The Onoda Cement Works, Korea, produced about 300,000 bbls. of cement in 1923, the bulk of which was exported to China. Japanese works partially destroyed by the earthquake are being rebuilt. An estimate of foreign production in 1923 credits Japan with 11,800,000 bbls.

British India.—A new works with a capacity of 30,000 tons a year has been erected in the Madras Presidency.

Siam.—The Siam Cement Co. recently installed a new plant with machinery obtained from Denmark, and is increasing its output to 1000 bbls. of cement a day. In the year 1922-23, imports of cement into Siam amounted to 8466 metric tons, valued at 304,912 ticals (rate of exchange, normal 37 ¢ latest 44 ¢). While the cement produced so far has been consumed locally, with the new plant the company hopes to produce sufficient for export to neighboring Asiatic states.

Afghanistan.—Foreign papers have announced that a cement plant will be constructed in Afghanistan. This mill at first will be experimental. The capacity will be about 3600 tons annually. Later, the plan is to build a larger plant having four or five furnace kilns. While Afghanistan has immense quantities of the raw materials lime and clay, there is still the question of fuel to be solved.

AUSTRALIA

South Australia receives its cement supply from two works, those of the South Australian and the Adelaide companies, the former at Brighton and the latter at Birkenhead, near Port Adelaide. An interesting feature of the mechanical equipment of the South Australian company is an aerial tramway, 3½ miles in length, carrying limestone from quarry to mill.

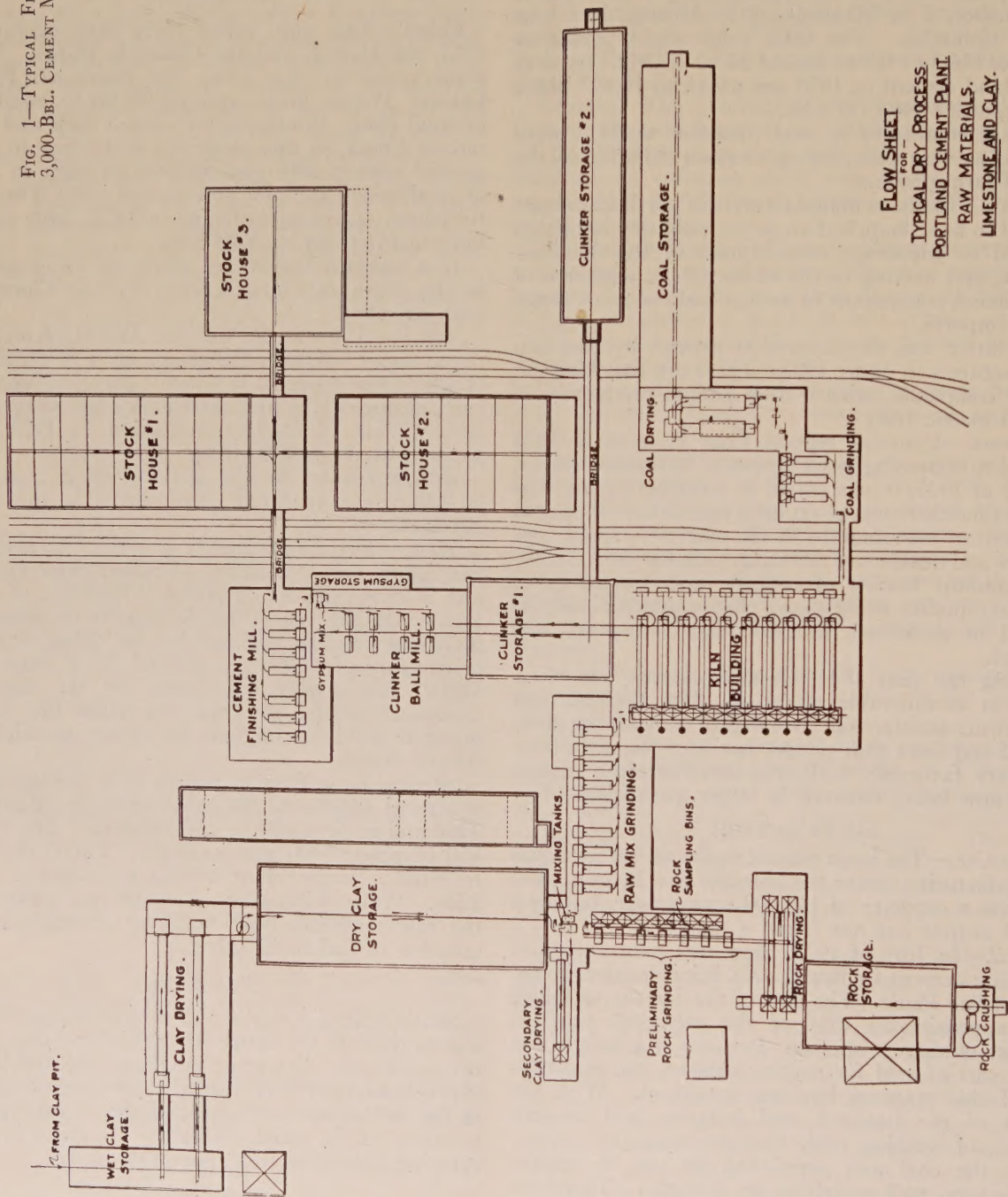
AFRICA

In the Congo district, the Ciments du Congo works has more than doubled its capital.

In the French West African colony, 15,313 tons of cement was imported in 1923, of which 75% came from French manufacturers.

In 1923, the Premier Portland Cement Co., Rhodesia, reported day and night operation beginning June 1. The four plants in South Africa reported production at half capacity and the Mozambique Portland Cement Co., Ltd., is said to have excellent prospects in the shape of a 20-year monopoly in that province.

FIG. 1—TYPICAL FLOW SHEET OF A
3,000-BBL. CEMENT MILL



FLOW SHEET
FOR
TYPICAL DRY PROCESS
PORTLAND CEMENT PLANT
RAW MATERIALS.
LIMESTONE AND CLAY.

Electric Power in the Cement Industry in Canada

W. G. H. CAM, A.M.E.I.C., A.M.I.E.E.
ELECTRICAL ENGINEER, CANADA CEMENT CO., LIMITED

From an article in *The Engineering Journal*, the Journal of the Engineering Institute of Canada, Montreal, Canada.

The productive capacity of cement mills in Canada totals about 44,000 bbls. or 7,700 tons daily. Hydro-electric power lies behind practically all the cement produced, and it is usual to consider that one horse power per barrel of capacity represents economical usage. Load factors run from 85 to 90% with reasonably good operating.

Kilowatt-hours, per barrel of finished cement, run from 13 to 18 according to the character of the raw materials and the machinery used. The Canadian barrel is 350 lbs., and a mill of 10,000 bbls. daily capacity will employ about 300 motors ranging in size from 250 h.p. downwards with a total of about 15,000 h.p.

Induction motors are almost exclusively used and squirrel cage rotors up to 175 h. p. A few synchronous motors appear on the list. Three-phase current at 60 or 25 cycles, and 550 or 440 volts is the form of the distributed supply.

Roughly speaking one-third of the energy used is employed in grinding and pulverizing the raw materials, one-third in grinding clinker and the remainder for various subsidiary purposes. The circle diagram, plate No. 3, shows actual distribution of power consumption in a 3,500-bbl. mill.

In the early days of the industry in Canada, marl deposits were mainly exploited and a large number of

wet process mills were built. At present, however, most of the mills use limestone rock with the addition of the requisite amount of clay or shale to make a true portland cement mixture, and the dry process of manufacture is almost exclusively used.

Well drills, steam-shovels and electric haulage are typical of the quarry lay-out. Roll, gyratory and jaw crushers and hammer mills do the crushing; ball mills of various kinds and tube mills complete the pulverizing process. Rotary kilns run all lengths from 60 ft. to 150 ft., and 8 ft. to 10 ft. diameter. Conveying is handled by bucket, belt and screw conveyor. Dryers are mainly rotary. Coolers are stationary or rotary. Packing is handled by machine through a valve in the bottom of the sack.

The necessity of keeping up with current repairs, in what is essentially a destructive process, accounts for a considerable proportion of the labor employed, for apart from repairs and machine tending, inanimate power does practically all the hard work.

It should be borne in mind, however, that while an abundance of cheap hydro-electric power cheapens the mechanical process, cement manufacture here as elsewhere is a chemical industry calling for constant technical supervision and continuous sampling, testing and adjustment at every stage of the process, to insure the uniformity and high quality of the product marketed.

The typical flow sheet, Fig. 1, of a 3,000-bbl. mill figured, should prove interesting for purpose of compari-

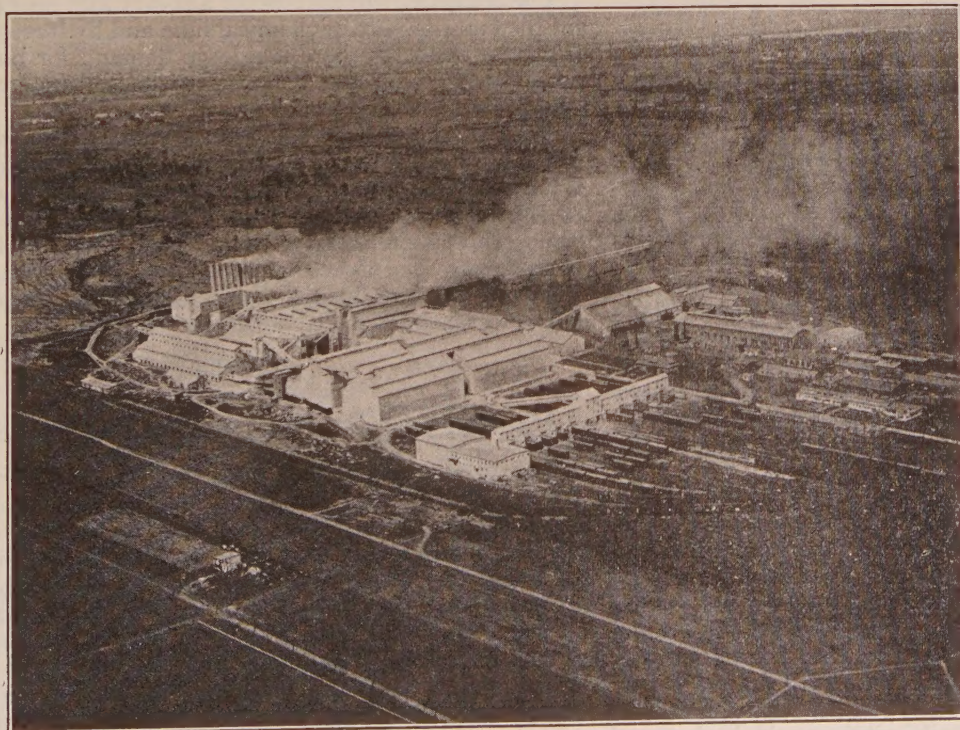
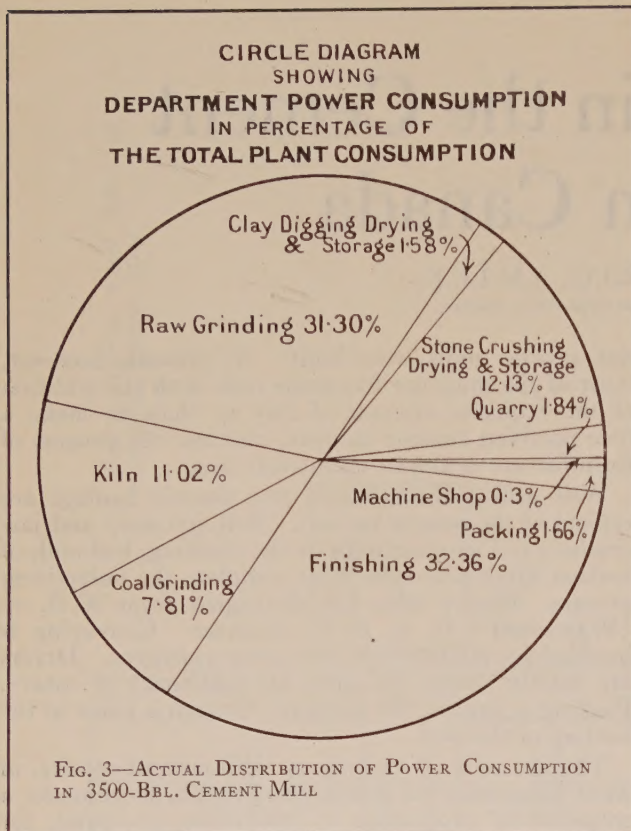


FIG. 2—LARGE CANADIAN CEMENT MILL, 10,000-BBL. CAPACITY



son with the practice of other countries, while a birds-eye view, Fig. 2, of a 10,000-bbl. plant has been included so that those who have not had the opportunity of seeing for themselves may realize the progress that has been made in the last twenty years in what is now one of the basic industries of Canada.

As compared with the United States the cement market of Canada is seasonal, and this accounts for the large cement storage capacity which is provided in Canadian mills so that operation may be more or less on a twelve-month schedule, although the market may be very dull for the winter months.

Phoenix to Build New Orleans Plant

Since January 1st of this year the Phoenix Portland Cement Co. has been making a careful study of New Orleans with the idea of establishing a plant there for the manufacture of portland cement and lime. Plans have now been completed and work will be started immediately on the construction of a plant, to be built on a tract of 15 acres of land acquired from the Board of Port Commissioners, on the Industrial Canal at the turning basin, and adjoining the plant of the Lukens Steel Co.

The first unit to be constructed will have a daily capacity of 2500 bbls or 10,000 bags, of portland cement and 1000 bbls. of lime, but the plant will be so laid out that this capacity can be doubled as rapidly as market conditions warrant it. The initial investment of this first unit will be approximately \$2,000,000. The plant will represent the last word in cement mill design and construction. Owing to the nature of the raw materials, the wet process will be used. The plant will be entirely fireproof, as all buildings will be built of

reinforced concrete and steel. The operation will be absolutely dustless and everything possible will be done on the part of the Phoenix company to make it a creditable addition to the industries of New Orleans. The construction will be done by the cement company's own organization under the supervision of R. J. Hawn, chief engineer, and everything will be done to push the work as rapidly as possible. It is planned to have the plant in operation by September 1, 1925.

The unique part of this new operation will be the character of the raw materials used. One of the raw materials is the filtration sediment, filtered from the Mississippi river waters by the City filtration plant of the Sewerage and Water Board. This material contains from 35% to 40% of calcium carbonate and the balance silica, iron and alumina. The ratio of silica to iron and alumina is 2.0 to 1 which is ideal for the manufacture of portland cement. An examination of the records, for many years past, shows the material to be very uniform in chemical analysis. It is very finely divided and all passes the 200 mesh sieve.

The New Orleans Sewerage and Water Board has approximately 200,000 tons of this material on hand at the present time, and in the operation of their plant, they currently produce more than the cement company's total requirements. A long-time contract has been made for the exclusive right to take this material. In the past, disposition of it has been an expensive problem, so the city departments were very glad to get rid of it at any price. As New Orleans grows, the amount of this material will increase and, in turn, the Phoenix company will need more of it as it expands its plant to take care of the increased growth of the city.

The balance of the required lime content will be obtained from oyster and clam shells, which constitute the other raw materials. These shells occur in large reefs in the water bottoms adjacent to New Orleans, and surveys have proved them to be practically inexhaustible. The Phoenix company has contracted with the State of Louisiana for the exclusive right to take these shells. The shells are practically pure calcium carbonate and together with the clay substance described, constitute remarkable raw materials for the manufacture of a very high quality of portland cement.

The company will also install a rotary kiln lime plant for the manufacture of chemical lime and hydrated lime from the shells, as there is a large demand for both of these products in the territory to be served by this plant.

Most of the output will be marketed in Louisiana, but as the plant will be situated on the Industrial Canal, with excellent deep water facilities, it is planned to also make shipments by water to the gulf ports and some export shipments, as well. With the completion of this plant, the three plants operated by the Phoenix Portland Cement Co. will have a combined output of 10,000 bbls. of Phoenix portland cement daily.

Production of Explosives Increases

The production of explosives in the United States during the calendar year 1923 was 23% larger than in 1922, according to reports from manufacturers to the Bureau of Mines. The manufacturers' reports showed that sales (excluding exports) during the year amounted to 8,078,053 kegs (201,951,325 lbs.) of black blasting powder, 60,371,314 lbs. of permissible explosives, a total of 529,727,859 lbs in all. As compared with 1922, these figures represent an increase of 13% for black powder, 39% for permissibles, and 28% for dynamite and other high explosives.

Electric Purification of Gas

By E. LEE HEIDENREICH

Extract from articles by Dr. H. Nitzsche in *Tonindustrie-Zeitung*, and Dr. Erich Oppen in *Zement*.

I. THE LURGI METHOD

The possibility of precipitating dust from a gas by letting the water pass through an electric field of high tension (about 50,000 volts), was first commercialized by the efforts of the American, Cottrell, in 1906, and the German, E. Möller, in 1907, who in 1911 brought forth the Cottrell-Möller Method, and later (1914) the Lurgi apparatus factory in Frankfurt a. M. The "flow sheet" of the Lurgi apparatus is indicated in Fig. 1—in a schematic form.

The precipitating apparatus is shown in form of a single tube, while in practice a number of pipes are used. The gas which is to be cleaned, enters from below and ascends along smooth, thin wires, as negative electrodes, which attract the dust, and let it drop along the inner sides of the tubes, which act as positive electrodes. The dust collects in a steady stream at the bottom, and is spouted away.

II. THE OSKI METHOD

These tubes or conduits above mentioned may be horizontal or vertical, and in the latter case assume the form as shown in Fig. 2, the "Oski" Method, where, as in Fig. 1, "Rohgas" means the original dust laden gas, "Reingas" the clean gas, and "Staub," dust.

The general electric arrangement, whether for direct or alternating current of high voltage, may be understood from Fig. 1 without further explanation.

While the electrical purification of gas is used in many industrial establishments, the cement industry is the one where dust collecting is of the greatest financial value, not only on account of the intrinsic value of the dust thus collected, but for the saving in wear and tear of the machinery, and for sanitary reasons.

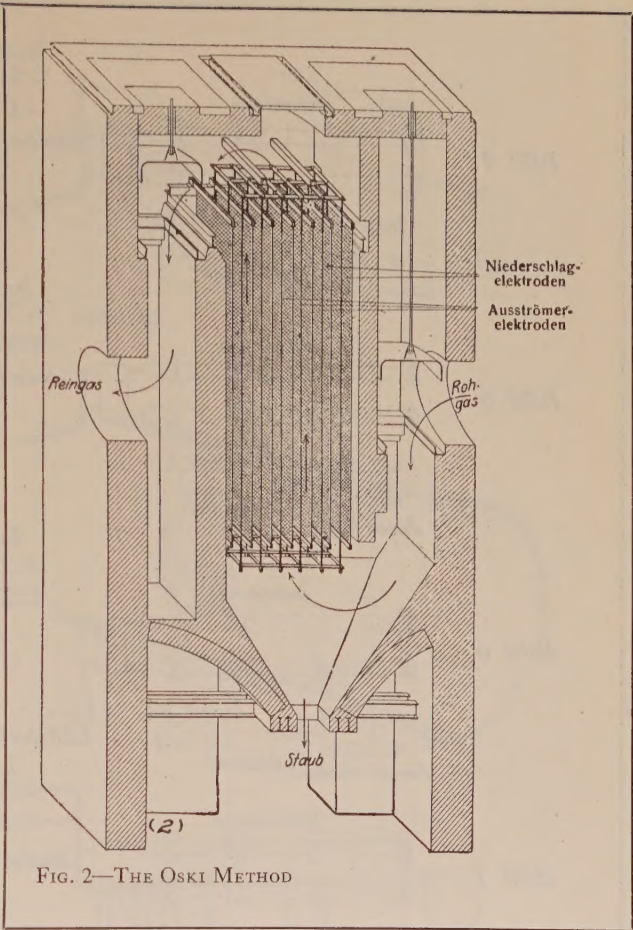


FIG. 2—THE OSKI METHOD

Fig. 3 shows a series of schematic lay-outs, where the electrical purification is applied. *EGR*, meaning "Electrische Gas Reinigung" stands for electrical purification, and "Drehrohröfen" rotary kiln, "Trocken Trommel" rotary dryer, "Fein Muhlen," finishing grinders, "Schroter," crushing machine, "EGR Kammer or -kammern," dust-cleaning bins and "Zement Silo," "Rohmehl Silo," cement silo and raw products silo.

As early as 1884, Lodge used an electric current for precipitating dust from gas in a lead smelter in England.

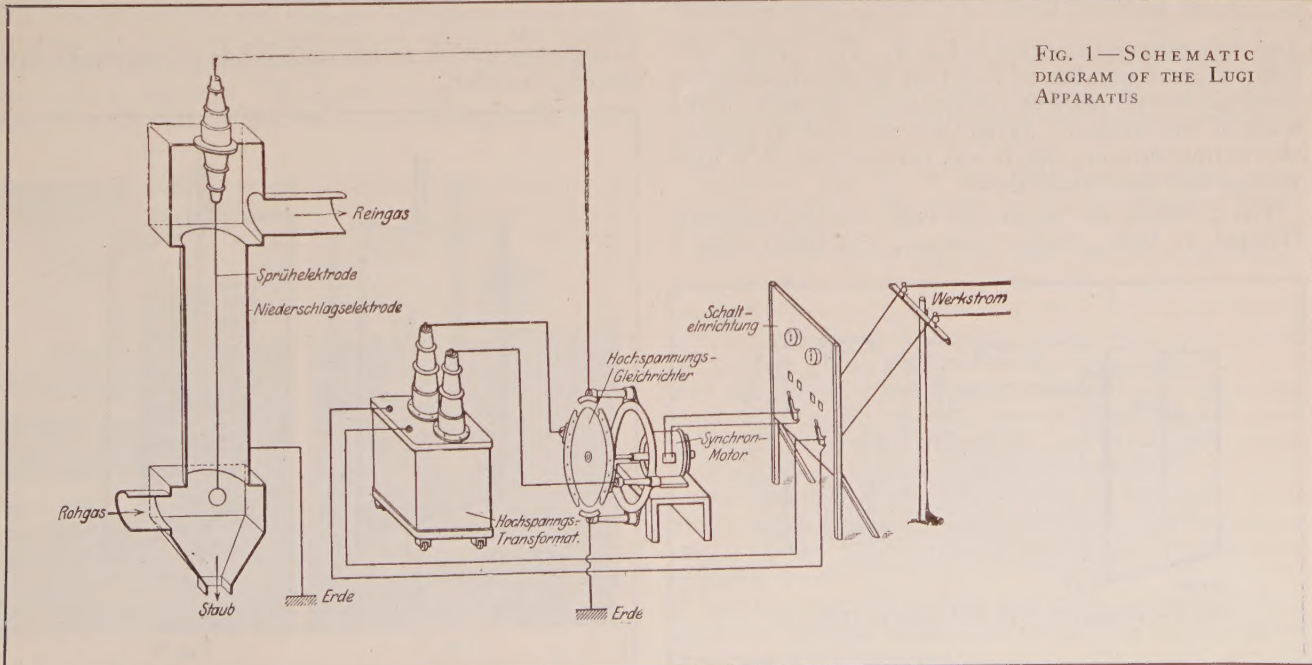


FIG. 1—SCHEMATIC DIAGRAM OF THE LURGI APPARATUS

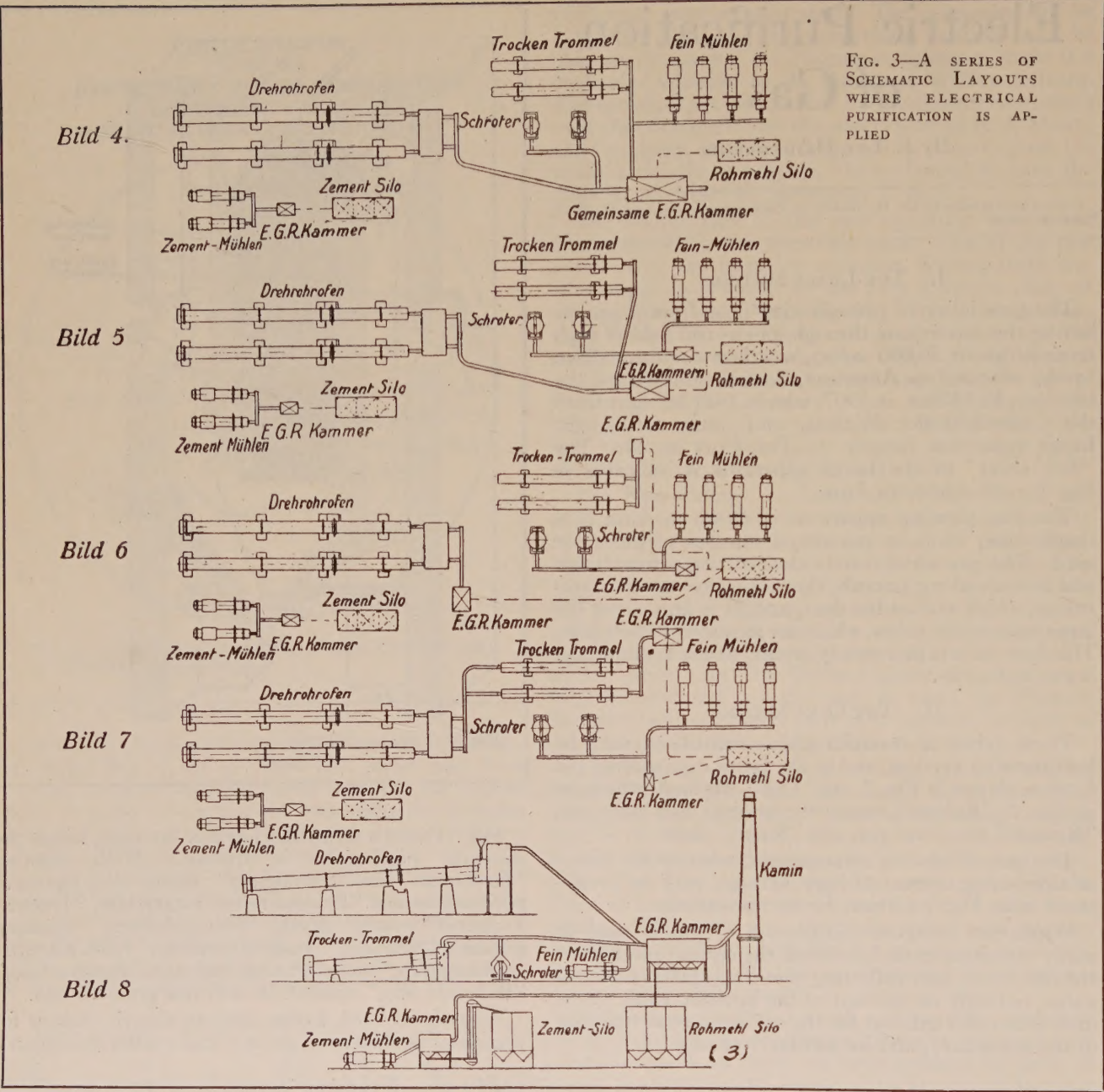
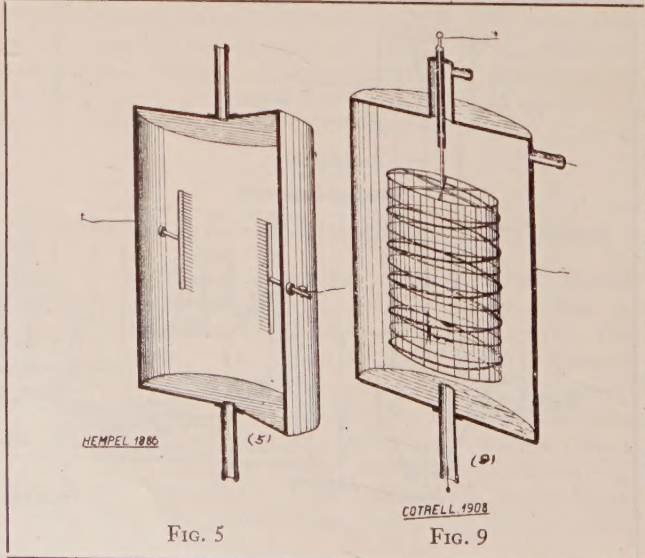
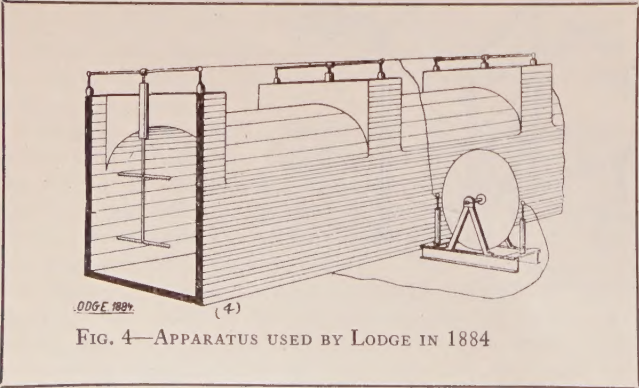


FIG. 3—A SERIES OF SCHEMATIC LAYOUTS WHERE ELECTRICAL PURIFICATION IS APPLIED

This apparatus is indicated in Fig. 4. The current runs from a great number of fine pins as electro-negative electrode to the positive precipitation-electrode of the walls of the conduit. Lodge was the first to employ alternating current, which was transformed to a high voltage and then made direct.

Fig. 5 shows the apparatus built by the mechanic Hempel in 1886, which, however, was based upon a

wrong principle as he led both kinds of electricity into the gas chamber.



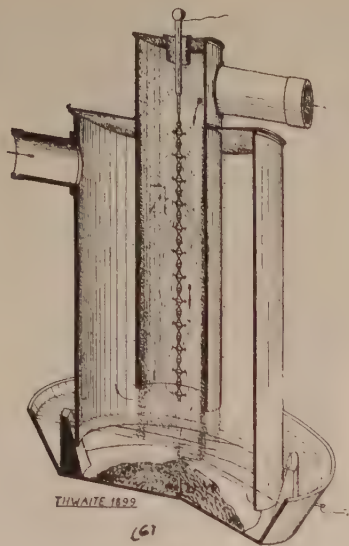


FIG. 6

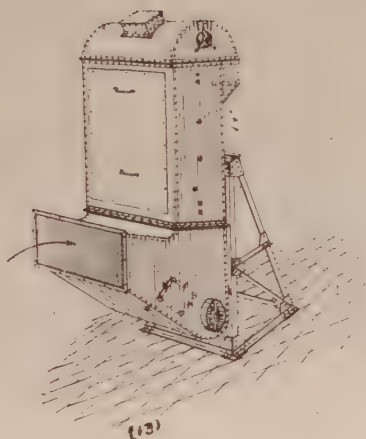


FIG. 13

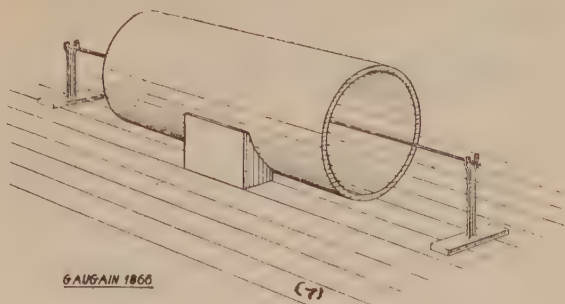


FIG. 7

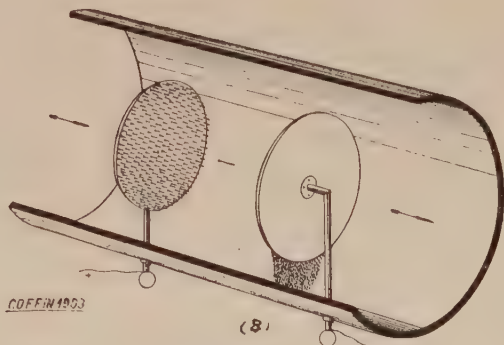


FIG. 8

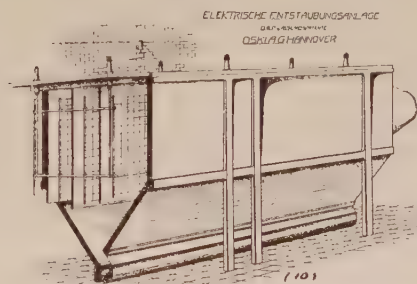


FIG. 10

Thwaite, however, Fig. 6, showed the right idea in 1899. The downturned gas flow was to be cleaned, and the electric current was brought upward by fine wires, causing the dust, or cement to fall against the smooth walls, and drop down, while the cleaned gas escaped at the sides to the top. The disadvantage here was however that the cleaned gas had to pass through the falling

cement, and again was exposed to contamination. Gaugain, in 1866, made quantitative analyses of the radiation from smooth, thin wires throwing the dust on the walls of the tube, Fig. 7. Coffin's apparatus, Fig. 8, 1903, proved that even water could be precipitated between unlike electrodes, when a number of fine points were placed opposite a smooth plate. Cottrell, Fig. 9, in his 1908 improvement, came back to smooth, thin wires, acting as explained above by Dr. Nitzsche. Fig. 10 shows a regular Oski process installation. The gas flows horizontally through a conduit, which hops down to a screw conveyor, for removing the precipitated dust. The precipitation electrodes consist of concrete plates provided with reinforcement of wire netting. Between the plates are isolated nettings, acting as electrodes. By the use of annealed wire, breakage of the nets is prevented. When the dust gets thick enough, it drops from the plates, and the electrostatic pressure prevents it from coming back. Fig. 11 shows the result of the apparatus not in use, and Fig. 12 the noticeable effect of the purification of the gases by the Oski apparatus. Another type of the Oski apparatus is shown in Fig. 13, where the dust slides down an incline, and the screw conveyor is not required.



FIG. 11

FIG. 12

Gun for Removing Clinker Rings

A new type of gun designed to remove clinker rings from cement kilns with the aid of special ammunition has been perfected by the Remington Arms Co. and one of the guns has been given a thorough trial in an eastern cement plant. Appreciating the severe menace of interrupted operation of cement kilns in many localities on account of clinker rings, the Remington company has gone into the subject thoroughly.

During the recent test at the cement plant, a very severe closing up of one of the kilns by a ring 30 ft. from the firing end was experienced. A passageway on one side of the kiln was opened up, to the extent of $4\frac{1}{2}$ ft. to the face of the kiln lining, with 55 shots consuming a period of time of between 20 and 25 minutes. This was at 10 a. m. Production was then resumed and at 3 p. m. the fuel was shut off, the object being to examine the obstruction. It was found that the blast had eaten away the edges of the opening to the extent of $1\frac{1}{2}$ to 2 ft. on each side, in addition to the material removed by the gun.

As it was desired to have the night and day foremen become familiar with the use of this method of removing the rings, the gun was turned over to these employees who started and stopped the kiln and fired additional shots to practically remove the obstruction around the whole surface of the kiln. This was done, however, more to break in the men than for any other reason, it being the impression of the superintendent of the plant that in a few hours added time in regular running of the plant the blast would entirely eat away what remained of the original obstruction. The added experimental work in this case consumed 55 more shots, leaving the kiln completely clean for continued production.

Officials of the company have arranged to keep the gun as regular equipment for removing the rings from the kiln. An I-beam has been placed on the face of each kiln, bolted to the hood, and will be left in place



FIG. 1—GUN DESIGNED BY THE REMINGTON ARMS CO. FOR REMOVING CLINKER RINGS. THE INSERT ON THE LEFT SHOWS THE SPECIAL CARTRIDGE USED



FIG. 2—FIRING END OF KILN WITH I-BEAM BOLTED TO HOOD
FIG. 3—GUN ATTACHED TO THE I-BEAM BY SPECIAL MOUNTING

permanently. On this I-beam is attached the simple method of mounting the gun which it is claimed requires but 15 or 20 seconds of time in making ready to fire the shots. The gun can also be easily removed from the mounting and taken away.

The gun is described by the manufacturers as large and well made, keeping in view at all times the adverse conditions under which it will be used, that is, considerable heat and particularly the gritty dust. The investigations leading to the production of this type of gun were made in close conjunction with one of the large cement manufacturers in the East.

Various types of weapons including high powered rifles were tried and the possibility of considerable damage being done at the end of the kiln by using high powered rifles or machine guns shooting the same cartridges was considered so much a hazard that these particular types of cartridges and guns could not be used. After several months of experimenting, the specially designed gun and cartridge shown in the accompanying illustration was brought out. Owing to the construction of the projectile used, its trajectory, or line of flight, is such that the possibility of missing the ring and going through the wall is lessened and also instead of being able to penetrate cleanly and directly a piece of boiler plate $\frac{1}{2}$ in. thick like a high powered bullet would, it simply spends its energy over a large area of surface. It does not penetrate as deeply but

transmits its jar to a much greater extent. The projectile is solid and strikes a blow of about a ton and a half and its mushrooming quality enables this energy to be distributed over a comparatively wide surface. The resulting shock and jar have proved to be what is required in breaking down annular rings which have proved hard to dig out with a water bar or other equipment.

In cases where it might ordinarily be necessary to shut down for a period of nearly 36 hours, with the gun and ammunition, it is claimed, it is possible to simply stop rotating the kiln, shut off the source of fuel, mount the gun in front of the peek hole and get it into action within 5 or 10 min. time. If this move is made in the early stages of the ring formation, according to the manufacturers, a few well targeted shots will suffice to break up the formation sufficiently to permit the resumption of work and if the formation is only appearing in one or two places, these projections can be removed entirely.

Lime in 1923

The Department of Commerce announces that according to reports for the biennial census of manufactures, 1923, the establishments engaged primarily in the manufacture of lime products in that year reported a total output valued at \$47,243,756, an increase of 52.3% as compared with \$31,015,487 in 1921, the last preceding census year. The total production for 1923 comprised 2,510,283 tons of quicklime valued at \$25,693,305; 1,255,562 tons of hydrated lime valued at \$13,851,455, 2,926,725 tons of limestone sold as such, valued at \$3,515,631; and miscellaneous products—crushed stone, ground limestone, flux, etc.—to the value of \$4,183,365.

Of the 333 establishments reporting for 1923, 68 were located in Pennsylvania, 33 in Virginia, 24 in Wisconsin, 22 in Ohio, 18 in Missouri, 14 in New York, 13 in Tennessee, 11 in Alabama, 10 each in Maryland and Massachusetts, 9 each in California, Illinois, Indiana, and Vermont, and the remaining 74 in 24 other states.

The statistics for 1923 and 1921 are summarized in the following statement. The figures for 1923 are preliminary and subject to such correction as may be found necessary upon further examination of the returns.

	1923	1921	Per cent of Increase
Number of establishments.....	333	292	14.0
Wage earners (average number) (a).....	12,290	10,345	18.8
Maximum month.....	Aug. 13,341	Aug. 10,995	.....
Minimum month.....	Jan. 10,604	Jan. 9,168	.....
Per cent of maximum.....	79.5	83.4	.....
Wages.....	\$13,522,069	\$9,801,651	38.0
Cost of materials (including fuel and containers).....	\$19,700,191	\$14,214,205	38.6
Products, total value.....	\$47,243,756	\$31,015,487	52.3
Lime:			
Quicklime—			
Tons.....	(b)2,510,283	(c)1,665,109	50.8
Value.....	\$25,693,305	\$18,732,086	37.2
Hydrated lime—			
Tons.....	1,255,562	726,337	72.9
Value.....	\$13,851,455	\$7,489,707	84.9
Limestone, sold as such—			
Tons.....	2,926,725	2,425,372	20.7
Value.....	\$3,515,631	\$3,121,987	12.2
Other products—crushed stone, ground limestone, flux, etc.—value.....	\$4,183,365	\$1,661,707	151.8
Value added by manufacture (d).....	\$27,543,565	\$16,801,282	63.9
Horsepower.....	74,263	(e)	.....
Coal consumed (tons of 2,000 lbs.).....	965,210	(e)	.....

(a) Not including salaried officers and employees nor proprietors and firm members. Statistics for these classes will be given in final report.
(b) Includes 24,113 tons reported as agricultural lime.
(c) Includes 67,754 tons reported as agricultural lime.
(d) Value of products less cost of materials.
(e) Not reported.

Portland Cement for October 1924

Tables, prepared under the direction of Ernest F. Burchard, of the Geological Survey, based mainly on the reports of producers of portland cement but in part on estimates, indicate that production and shipments for October were nearly at the same rate as in September. Shipments reached a new high level. Stocks decreased considerably but are 33% higher than in October, 1923.

PRODUCTION, SHIPMENTS, AND STOCKS OF FINISHED PORTLAND CEMENT, BY DISTRICTS, IN OCTOBER, 1923 AND 1924, AND STOCKS IN SEPTEMBER, 1924, IN BARRELS

Commercial District	Production		Shipments		Stocks at end of		Stocks at end of September 1924 (a)
	October		October		October		
	1923	1924	1923	1924	1923	1924	
Eastern Pa., N. J. & Md. . . .	3,342,000	3,598,000	3,922,000	4,219,000	1,075,000	752,000	1,373,000
New York. . . .	731,000	809,000	864,000	983,000	381,000	379,000	553,000
Ohio, Western Pa. & W. Va. . . .	1,266,000	1,495,000	1,412,000	1,919,000	159,000	471,000	895,000
Mich. . . .	925,000	1,080,000	980,000	1,132,000	178,000	286,000	338,000
Wis. (b) . . .							
Ill., Ind. & Ky. . . .	1,933,000	2,229,000	2,056,000	2,660,000	272,000	426,000	857,000
Va., Tenn., Ala., & Ga. . . .	838,000	1,115,000	844,000	1,185,000	272,000	290,000	360,000
Eastern Mo., Ia. & Minn. . . .	1,452,000	1,518,000	1,448,000	1,763,000	625,000	1,502,000	1,747,000
Western Mo., Neb. Kan. & Okla. . . .	979,000	985,000	935,000	1,220,000	696,000	874,000	1,109,000
Texas. . . .	332,000	415,000	326,000	407,000	227,000	215,000	207,000
Colo. & Utah. . . .	217,000	275,000	206,000	278,000	174,000	181,000	184,000
Calif. . . .	1,049,000	1,062,000	1,021,000	1,036,000	277,000	364,000	338,000
Ore., Wash. & Mont. . . .	286,000	239,000	271,000	279,000	276,000	403,000	443,000
	13,350,000	14,820,000	14,285,000	17,081,000	4,612,000	6,143,000	8,404,000

(a) Revised. (b) Began producing June, 1924.
Stocks of clinker, or unground cement, at the mills at the end of October, 1924, amounted to about 3,650,000 bbls. compared with 4,260,000 bbls. (revised) at the beginning of the month.

The Bureau of Foreign and Domestic Commerce, of the Department of Commerce, reports that the imports of hydraulic cement in September, 1924, amounted to 134,245 bbls., valued at \$226,227. The total imports in 1923 amounted to 1,678,636 bbls., valued at \$2,964,098.

The statistics of imports and exports of hydraulic cement in October, 1924, are not available.

IMPORTS AND EXPORTS OF HYDRAULIC CEMENT, BY MONTHS, IN 1923 AND 1924, IN BARRELS (a)

Month	Imports		Exports	
	1923	1924	1923	1924
January.....	71,686	153,732	74,169	88,586
February.....	20,529	162,930	88,531	62,606
March.....	66,521	160,517	98,861	91,224
April.....	76,899	148,138	85,662	83,200
May.....	88,480	161,304	103,634	88,850
June.....	111,559	196,655	77,203	74,064
July.....	286,106	109,098	82,774	60,139
August.....	324,008	192,634	73,201	85,883
September.....	215,785	134,245	77,121	69,470
October.....	172,051	(b)	74,302	(b)
November.....	140,590	.....	85,743	.....
December.....	104,422	.....	80,487	.....
	1,678,636	.....	1,001,688	.....

(a) Compiled from records of the Bureau of Foreign and Domestic Commerce.
(b) Imports and exports in October, 1924, not available.

Cement Centennial Observed

Portland Cement Association Selects Officers at Annual Meeting

The annual meeting of the Portland Cement Association, held in Chicago in November, 1924, was of unusual interest, the centennial of the patenting of portland cement being observed. The three day meeting was brought to a close with a banquet Wednesday evening, November 19. On the opening day, reports of standing committees were prepared, and on Tuesday, November 18, the morning and afternoon sessions were given over to the usual program of reading and discussing specially prepared papers on cement mill practice. The subjects presented and discussed were the following:

"Fire Prevention and Cement," by R. S. Moulton, assistant secretary, National Fire Protection Association; "The Economic Limit and Operating Flexibility of Waste Heat Boiler Installations," by Helmuth Krarup, superintendent, Hawkeye Portland Cement Co.; "High Early Strength Cements," by Dr. Gustav Haegermann, director, German Portland Cement Association Laboratory; "European Cement Plant Practice," by H. A. Schaffer, conservation engineer, Portland Cement Association.

On Wednesday, November 19, the morning session was devoted to the usual business session, at which committee reports were presented to the members, the annual election of officers concluding the session.

F. W. Kelley, of Albany, New York, president of the Helderberg Cement Co., who has served as president of the Portland Cement Association for the past two years, was presented on retiring from office, an engrossed testimonial signed by practically the entire membership of the Association, and recording appreciation of the membership for his contribution to the advance of Association work during his administration.

OFFICERS ELECTED

The officers elected for the ensuing year were the following: Blaine S. Smith, Chicago, general sales manager, Universal Portland Cement Co., was elected president; Lowell R. Burch, New York, vice president, Atlas Portland Cement Co., was elected first vice president of the Association; and C. A. Irvin, Chicago, vice president, Alpha Portland Cement Co., was elected second vice president. John W. Boardman, Detroit, vice president of the Huron and Wyandotte Portland Cement Companies was reelected treasurer.

CENTENNIAL CELEBRATION

The afternoon session of Wednesday, November 19, was given over entirely to a special program in commemoration of the cement anniversary. Representatives of various professions related to or associated with the several branches of the construction industry presented short talks relating to the effect concrete has had in the advance of engineering, architecture, and associated construction lines as coming under their particular observation and practice. After the foreign and other guests had been given a few appropriate words of welcome by President Blaine S. Smith, F. W. Kelley acted as chairman of the session, and opened it with a centennial address.

Following Mr. Kelley, papers were presented by A. N. Talbot, Professor, Theoretical and Applied Mechanics, University of Illinois, Urbana, representing the American Society of Civil Engineers; Charles E. Fox, president, Illinois Society of Architects, Chicago, representing the American Institute of Architects; H. R. Safford, vice president, Chicago, Burlington & Quincy R. R. Co., Chicago, representing the American Railway Engineering Association; P. H. Bates, Chief of Section, Structural Engineering and Miscellaneous Materials, representing the U. S. Bureau of Standards, Washington, D. C.; Richard L. Humphrey consulting engineer, Philadelphia, representing the American Society for Testing Materials; A. E. Lindau, president of the American Concrete Institute, Chicago, representing the American Concrete Institute; and Edward N. Hines, chairman of Board of County Road Commissioners of Wayne County (Detroit), representing road builders and highway officials.

The unquestioned national prominence and respect which all of these participants command, brought forth, as was naturally to be expected, real contributions to the history of cement's first one hundred years.

Several of the foreign guests were also on the program, among them being: Gustave Deroover, Brussels, Belgium, president, Union des Cimenteries; president, Groupement professionnel des Fabricants de Ciment Portland Artificiel de Belgique; Dr. Peter Hans Riepert, Charlottenburg, Germany, president, Deutscher Zement Bund; Charles Candlot, Paris, France, representative of French Portland Cement Industry; Poul Larsen, Copenhagen, president, Tunnel Portland Cement Co., England, Alborg Portland Cement Fabrik, etc., Denmark; and A. Holter, Brevik, Norway, director-manager, Dalen Portland Cement Fabrik, each of whom gave, from the viewpoint of his personal experience, a brief description of the cement industry and its growth in his native country.

Complete list of foreign guests present and participating in this celebration as representatives of foreign cement companies or associated groups of cement manufacturers included the following:

Charles Candlot, Paris, France, representing French Portland Cement Industry; Gustave Deroover, Brussels, Belgium, in charge of research and general manager, Societe anonyme de Niel-on-Rupell; Leon Dereme, Harmignies, Belgium, Societe Anonyme Ciments Portland Artificiels Belges; J. Van den Heuvel, Hemixem, Belgium, Societe Anonyme des Ciments J. Van den Heuvel; A. Holter, Brevik, Norway, general manager, Dalen Portland Cement Fabrik; Dr. Ing. P. H. Riepert, Berlin-Charlottenburg, Germany, Government architect and director of Deutscher Zement Bund; Dr. Gustave Haegermann, Berlin-Karlshorst, Germany, director of laboratories, Associated German Portland Cement Manufacturers; Dr. Nicolaus Simon, Oppeln, Germany, director of Portland Cement Co., of Groschowitz; Dr. Heinrich Mueller, Kalkberge, Germany, president, Vereins Deutscher Portland Cement Fabrikanten; Dr. Phil E. Schott, Heidelberg, Germany, technical chemist and director, A. G. Heidelberg; Poul Larsen, Copenhagen, Denmark, president, Tunnel Portland Cement Co., England, Alborg Portland Cement Fabrik, Denmark, etc.; C. A. Moller, Copenhagen, Denmark, engineer, F. L. Smidth & Co.; Dr. Friedrich Hubner, Balingen, Germany, director der Cementfabrik Balingen; Dr. Carl Schwenk, Ulm, Germany, representing E. Schwenk Cimentfabrik; Ernst G. W. Pruessing, Nienburg, Germany, director Pruessing & Co. (portland cement manufacturers).

Signal Mountain Company Plans Extension

Following the announcement that a mortgage of \$500,000 had been cancelled by the Signal Mountain Portland Cement Co., it was announced the production capacity of the plant will be increased 50% after the first of January, 1925. A third kiln is to be added, together with the other necessary equipment and storage capacity to care for the increased production.

The plant of the Signal Mountain Portland Cement Co. has been running to capacity for some time and a strong market has been enjoyed. After the first of the new year, it is anticipated that the sales force of the company will be enlarged.

It was reported that 250 bonus checks were distributed among employees in the office and plant in November, these bonus checks being distributed each month if the production of the plant rises above a certain figure, and given as a reward for efficient service.

The company has completed the necessary filling in replacing with a new road, a portion of the Cheromee trail which was taken over by the company, and a crushed rock surface is now being laid. A concrete surface can be put down by the county after the completion of the preliminary work which is now under way.

New England Company Progressing

The plans of the New England Portland Cement & Lime Co., are going forward rapidly and for several weeks a force of 75 to 100 men has been employed constructing the company's new lime unit, near Rockland, Me. Officials of the company expect to have this unit in operation with a capacity of 500,000 bbls. of lime not later than May 1, 1925. The lime unit will be followed immediately by the construction of a cement unit of 2000 bbls. daily capacity.

A battery of 4 improved Schaffer kilns and the largest size Schaffer hydrator are being installed by the company with adequate storage facilities provided. The lime plant is laid out for the ultimate erection of 6 additional kilns, making a total possible annual capacity of 1,250,000 bbls. of lime. With the combined efforts of the Schaffer Engineering Co. and W. R. Phillips, vice president and general manager, the company expects to have as modern a lime plant, when completed, as there is in the United States. Mr. Phillips was formerly vice president and general manager of the American Lime & Stone Co., Bellefont, Pa., and was also, formerly, secretary and general manager of the National Lime Association.

The following is a list of the Directors of the New England Portland Cement & Lime Co.: John J. Cunningham, Portland, Me.; Charles A. Dodge, Cambridge, Mass.; Charles A. Maguire, Providence, R. I.; George G. Shedd, Manchester, N. H.; James J. Scully, Cambridge, Mass.; George W. Allison, Boston, Mass.; Walter S. Rowe, Portland, Me.; Willard D. Woodbury, Boston, Mass.; Guy A. Hersey, Bangor, Me.; Fred V. Murtfeldt, Boston, Mass.; Richard P. Keefe, Worcester, Mass.; James H. McNamara, Eagle Rock, Va.; William P. Shine, Cambridge, Mass.; Richard W. Saunders, New York City; Fred C. Black, Thomaston, Me.; Obadiah Gardner, Rockland, Me.; S. T. Kimball, Rockland, Me.; Walter E. Bowe, Boston, Mass.; Alfred S. Black, Boston, Mass., is president and William R. Phillips vice president and general manager.

Columbia Cement Co. Constructing Plant

The Columbia Cement Co., of which Fred A. Ballin is president and F. E. Trask, general manager, is completing arrangements for a new portland cement plant to be located at San Diego Bay, Calif. The main office of the company is in Los Angeles.

Contracts have already been awarded for two kilns, one of which is to be 232 ft. long and 12 ft. in diameter. A number of electric motors for individual drives in the plant have also been contracted for.

The wet process will be used and the plant will be equipped with waste heat boilers and completely up-to-date. Both white and gray portland cement will be manufactured.

The company will also operate a hydrated lime plant tile, brick and glass plants.

A New Cement Factory at Calais, France

The recently formed limited company, Ciments du Calais, at the end of this month, put its first kiln into operation. The work of installation was begun in November, 1923. The factory is situated quite close to Calais at the foot of a bank of chalk 70 metres high. The raw materials are obtainable on the spot. The factory has direct access to the port of Calais, West Basin, and to the Calais to St. Omer canal. There are facilities for loading both seagoing and inland vessels without intermediate transport. The company is aiming at exporting its products to Ireland, England, French coast towns, Holland, etc., while the canal system is to be utilized to reach western Belgium, and the south of Holland.

As well as cement there will be manufactured, lime, ground chalk, and the exportation will be undertaken of chalk in blocks. The latter block exportation will take place between the active periods.

The plant comprises two main buildings served by a number of railways. The first building, 250 metres long and 20 metres wide, is for the treatment of the primary materials, the furnace room, the fuel house, etc. The other 160 metres long and 20 metres wide comprises the clinker room, the grinding room, storing and bagging departments. A triple way separates the two principal buildings. The material of the cement manufacturing department of the business comprises two rotary kilns 2.50 metres in diameter and 60 metres long, with their crushers and other subsidiary apparatus.

The average production of each kiln is 140 tons of clinkers per 24 hours. The annual production of the cement department will be from 80 to 85,000 tons.

Each piece of equipment is driven by an electric motor. For the motive power (2,500 h. p.) the factory relies on two sources either of which can be switched over at will. The second kiln will be started up in January, and full production is expected in March, 1925.

Rotary Cooler Patented

A rotary cooler for cement clinker, patented by P. T. Lindhard is described in the *Journal of the Society of Chemical Industry* as an inner shell supported concentrically within an outer shell and free at its discharge end from the outer shell. Means are provided for discharging the cooled material from the outer shell and for supplying cooling air to the annular space between the shells at the end remote from the discharge end.

Men and Mills

Notes from the Field

Plans for financing the Red Star Portland Cement Co., La Salle, Ill., are well under way and it is expected that actual erection of the plant will be started soon.

All Texas cement mills are running at full 24-hour capacity to keep up with orders. Texas concrete road work is on the increase and a large percentage of the output of the Texas cement plants is going into roads and streets.

About 7000 bbls. of cement from the Trinity Portland Cement Co. are being used in the Texas Memorial Stadium at Austin, the new athletic bowl on the state university campus.

The Texas Technological college at Lubbock, the new state institution is also being supplied by the Trinity company. The Dallas Mills are supplying cement for the Sante Fe terminal building at Dallas, a \$5,000,000 structure believed to be one of the largest in the United States from point of floor space.

Other projects which are requiring cement from the Texas mills are the Carza dam for which a \$5,000,000 bond issue was voted; construction in connection with a new belt line around Dallas by the Houston and Texas Central R. R.; and about \$7,000,000 worth of paving included in the 1924-25 program of the city of Dallas.

J. M. Smallshaw for several years a member of the engineering staff of the Chain Belt Co., Milwaukee, has recently joined the sales department of the same company. Mr. Smallshaw was formerly associated with the Dixie Portland Cement Co. where he went after graduating as a mechanical engineer at Purdue University. Later he became associated with the Wolverine Portland Cement Co. Ralph Bird is manager of the cement mill sales for the Chain Belt Co., which manufactures chain, conveyors and other engineering equipment under the trade name REX.

The Bath Portland Cement Co. which owns the former Quaker plant at Martin's Creek has had a large force of engineers and men at work removing topping and general repair work for a long time, according to a report from Bath, Pa. Plans are now under way to start up this plant in full blast early next spring.

The fall season has had no visible effect upon the cement industry in the Lehigh region. Production continues at unprecedented figures with shipments awaiting the finished product. As yet, no cement has been placed in storage. Two night packing crews are at work in the West Coplay mill of the Lehigh company.

Cement continues to move out of the Egypt cement mills as fast as it is manufactured, and many heavy shipments of cement are leaving the Bath, Pa., freight yards at the present time.

Major Henry A. Reninger, of the Lehigh Portland Cement Co., Allentown, Pa. was recently re-elected vice president of the National Safety Council at the thirteenth annual congress held at Louisville, Ky.

Charles Muth, for 26 years a quarryman for the Atlas Portland Cement Co. died recently at his home in Northampton, aged 68 years.

Harrison D. MacFetridge, Allentown, assistant purchasing agent of the Lehigh Portland Cement Co., died Oct. 17, at St. Luke's hospital, Allentown, Pa.

The Public Service Production Co. with headquarters, in Newark, N. J., recently sent its organization to Easton, Pa., to begin operation on the New Bath Portland Cement Co.'s plant at Sandt's Eddy.

Superintendent C. A. Christ and E. Baughman, the auditor for the company, are advertising for men to start this mill, which will cost approximately one million and a half dollars when completed. There will be a great deal of steam shovel work as the plant progresses and it is expected that the operations will attract wide attention not only from the magnitude of the project but also from the modern construction methods which will be employed by this company.

The National Cement Co.'s plant at Ragland, Ala., which was recently destroyed by fire, has been partly rebuilt. This company is now producing 80,000 bbls. of cement per month and is shipping the entire output. The company is rapidly getting back to normal production and will soon have all the burned buildings replaced with new structures.

The Tidewater Portland Cement Co. is contemplating increasing its capacity 50% next spring by adding sufficient mills to keep all the kilns going continuously.

Among deeds filed recently in the office of Recorder Stine, Allentown, Pa., for real estate transfers was one for 12.607 acres in Whitehall Township from the Whitehall Cement Mfg. Co. to the Coplay Cement Mfg. Co., the consideration calling for \$12,500.

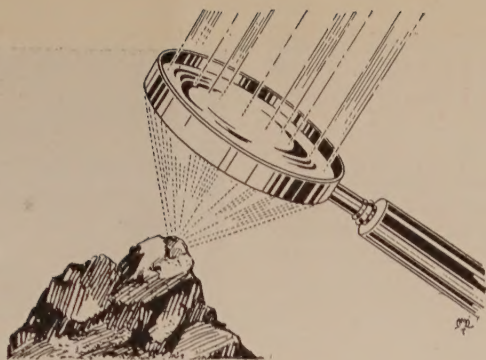
The Macdonald Engineering Co., Chicago, Ill., has just closed a contract with the New Egyptian Portland Cement Co., Port Huron, Mich., for an additional deep bin cement storage house, consisting of four 32-ft. diameter x 80-ft. high bins together with side pockets and inter-space bins with an approximate storage of 80,000 bbls. of cement.

The three-shift method of operation which was followed at the plant of the Acme Portland Cement Corp., Catskill, N. Y., under former management has been discontinued.

The Clarke Chemical Co., Wickliffe, Ohio, has awarded a contract for a complete new plant to The Austin Co., Engineers and Builders, Cleveland. The Clark Chemical Co. manufactures numerous products including carbonic acid, commercial, nitrous and medical oxygen and hydrogen for welding purposes.

During the past year the Foote Bros. Gear & Machine Co., of Chicago, has considerably expanded sales and advertising activities on its line of IXL speed reducers and general industrial gears. In order to better serve customers in various sales territories and to extend engineering assistance on gearing, transmission and speed reduction problems, the Foote company has established sales offices in a number of different cities throughout the United States and Canada, having recently completed arrangements with the Canadian firm of Darling Bros. for the exclusive distribution of its IXL gear products and reducers throughout the Dominion of Canada.

John A. Roberts, formerly of Milwaukee, Wis., is now connected with the Phoenix Portland Cement Co., Birmingham, Ala.



In Seattle,
as in Philadelphia
—GANDY

TILE CONVEYOR

GANDY BELT: 16 inch, 4 ply, 22' centers; 8" drive and idler pulleys; screw take-ups; speed 80 r. p. m.; from 1½ h. p. motor, geared down for drive. Belt slides over metal covered table as shown in photograph; tile oiled by felt roll running in pan of oil; equipment and belt sold as a unit.

Belt recommended to all brick and clay plant managers by C. A. Houlahan, superintendent of the plant.

YOU CAN'T SMELT MUCH METAL WITH A MAGNIFYING GLASS ! ! !

—And you need more powerful belts when you tackle jobs where heat, steam, oil and exposure affect the belting. Even the best rubber and leather belts cannot give knock-down-drag-out service on jobs that call for Stitched Cotton Duck Belts. Gandy Belt is *not* a substitute. It is built for use on conveyors, elevators, drives; under conditions that make ordinary belting inadequate. Gandy Belt is backed by a record of almost half a century of such service to industry. Let us tell you more about it. Write for complete information and samples of Gandy Belt. *Tough and pliable—but not expensive.*

THREE TYPES: Gandy Stitched Cotton Duck Belting, for ordinary indoor work. Thermo-Gandy, specially treated for outdoor installations and extremes of heat, cold, steam, etc. Gandy Wax-Impregnated Belt; white, washable, for conveying food products in bulk.



GANDY

The name "Gandy" is not a generic term covering all Stitched Cotton Duck belt. It is the trade marked name designating *only* the product of the Gandy Belting Company of Baltimore, Maryland, who originated this type of belting in 1880. Gandy Belt is distinguished by the green edge and the Gandy trade mark.

THE
GANDY BELTING
COMPANY

762 WEST PRATT STREET
BALTIMORE, MARYLAND
NEW YORK CHICAGO

The general office of the Indiana Portland Cement Co., has been moved from the State Life Bldg. to 808 Continental National Bank Bldg., 17 North Meridan St. and Circle, Indianapolis, Ind.

The Societe Anonyme des Ciments de Mons has been absorbed by the Cimenteries et Briqueteries Reunies de Bonne Esperance, Raevels & Loen, forming, together with this company, the Societe Anonyme Cimenteries et Briqueteries Reunies, Anvers, Belgium, which constitutes a group of four mills namely: Bonne Esperance, Raevels, Loen and Mons.

E. Struckmann, formerly connected with the Pyramid Portland Cement Co., Des Moines, Ia., is now with the Knickerbocker Portland Cement Co., at Hudson, N. Y.

Charles Boettcher, head of the Cement Securities Co., and his son Claude K. Boettcher are financially interested in the building of a new four and one half million dollar hotel at Denver, to be known as the Ritz-Carlton. Claude Boettcher has recently been elected a member of the board of directors of the Denver Tourist Bureau.

The Macdonald Engineering Co., Chicago, Ill., has recently closed a contract with the Virginia Portland Cement Co., subsidiary of the International Cement Corp., for all of the general construction work in connection with a new million barrel cement plant to be located at South Norfolk, Va.

The Glens Falls Portland Cement Co., Glens Falls, N. Y., has recently awarded a contract to the Macdonald Engineering Co., Chicago, Ill., for cement storage silos, consisting of six 40-ft. diameter by 60-ft. high tanks with open basement and monitor above, standard deep bin construction, having an approximate capacity of 145,000 bbls. F. L. Smidth & Co., 50 Church St., New York City, are consulting engineers.

Trade Publications

Vulcan gasoline locomotives. Vulcan Iron Works, Wilkes-Barre, Pa., has just issued a new 20-page bulletin, No. 101, 8½ in. x 11 in., devoted exclusively to the Vulcan worm gear drive gasoline locomotive. This illustrated booklet deals with a type of locomotive that is distinctive in every feature. In addition to a complete description there are illustrations showing various parts of the locomotive. A 4-page leaflet is enclosed giving the rated hauling capacities of all the popular sizes from 3 tons to 25 tons.

The Vulcan company also builds the well known Vulcan steam locomotive, and friends of the latter will recognize in these gasoline locomotives a similarity in design and construction.

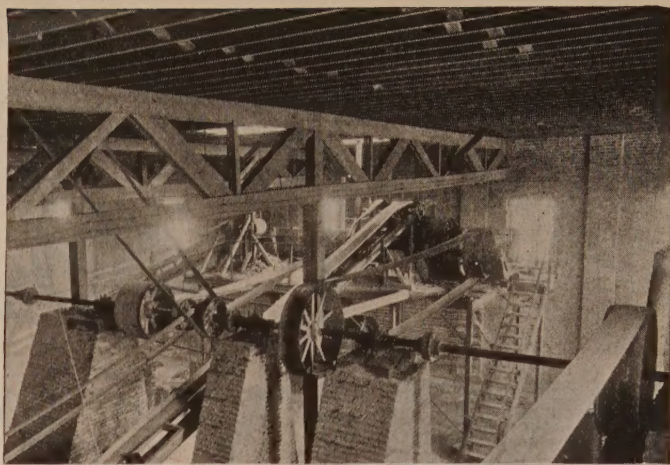
Floor Operated Electric Hoists is the title of an illustrated, descriptive price list and catalog just issued by the Shepard Electric Crane and Hoist Co., Montour Falls, N. Y. The size of the catalog is 9 in x 11 in. and it contains 60 pages with paper covers.

This catalog is a comprehensive book describing each type of floor operated hoist made by the Shepard company and illustrates an installation, gives a view of the hoist, reference drawings and dimensions and complete information regarding capacities, prices, etc.

The Condensed Catalog of Mechanical Stokers, issued by the Stoker Manufacturers Association has been compiled in keeping with the associations' policy that greater service to the industry that these manufacturers represent collectively, can be given. Since the organization of the association in 1918, energies have been largely directed to a study of the ways of increasing service.

In this book which is 8½ in. x 11 in. containing 32 pages with paper covers, is offered what is believed to be a brief but complete description of all prominent makes of mechanical stokers. The descriptive matter is strictly confined to engineering facts presented not as advertising but simply as a matter of information allowing the reader to draw his own conclusions. There are 12 manufacturers represented producing chain grate stokers, underfeed stokers, and overfeed stokers.

The book is unique in that it is a complete catalog of the various competitive manufacturers of mechanical stokers. It is part of the educational advertising campaign being conducted by the Stoker Manufacturers Association and copies may be obtained from W. V. McAllister, foot of Walker Street, Detroit, Mich.



GOODYEAR MEANS GOOD WEAR



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Goodyear makes specially strong and abrasion-resisting belts for the cement industry—conveyor belts for the economical handling of rock, and efficient transmission belts for crusher, grinder, kiln, dryer and finisher drives, and for packing and loading machines.

These belts are designed and built to perform economically and efficiently under severe conditions of load, temperature and grit-laden atmosphere.

They are scientifically specified to your particular requirements by the Goodyear Plant Analysis method and the G. T. M.—Goodyear Technical Man.

Other Goodyear Mechanical Goods for this industry include steam, pneumatic tool, air drill, water, and fire or mill hose; asbestos, and rubber packings. For further information about them, write to Goodyear, Akron, Ohio, or Los Angeles, California.

Goodyear Means Good Wear

GOODYEAR